



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

Fig: 1.

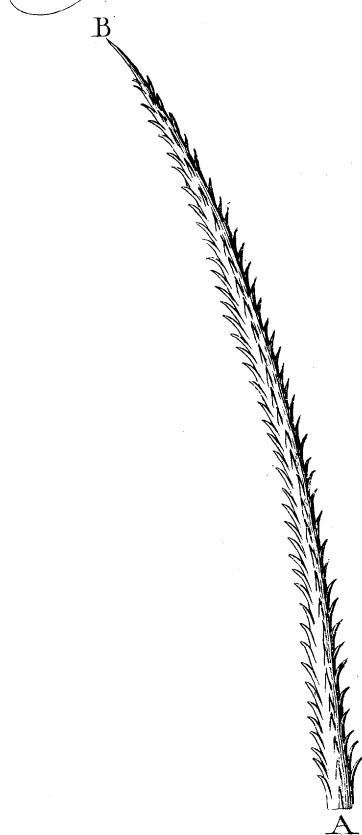


Fig: 2.



Fig: 3.



Fig: 5.

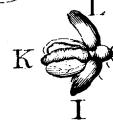


Fig: 4



I. Additional Observations upon the Production of Mites, &c. In a Letter from Mr. Anthony van Leeuwenhoek, F.R.S.

Delft, September 22. 1711.

Honourable Gentlemen,

I Did at first intend to have sent you an Extract only of the following Observations ; but I have since changed my Mind, and thought fit to Communicate them to you, as I made them from time to time.

I have formerly acquainted you how those little *Animalcula*, which we call Mites, couple and lay their Eggs, and how young Mites are again produced out of those Eggs, as also that I observed the Hair upon their Bodies. And tho' I then imagin'd, that I had observed every thing about the Mite that was to be seen, yet I have thought fit to view one of these *Animalcula* again with a Microscope ; and the rather, because that I found in observing those small *Animalcula* that feed upon the Nutmeg, that those Particles upon their Bodies, which one would take to be Hairs, are really not so, for I cannot allow those Particles to be Hair, or Wool, unless they are smooth and even, setting aside the Bark, or Skin of the Hair, which may be the cause of its being a little rough and uneven.

Those

Those six or eight long Particles that are upon the Body of the Mite, and which one wou'd call Hairs, are longest upon the upper part of the Body, and are twice as long as those upon the side of the said little Creature: And when one carefully, and thro' a Microscope that magnifies very much, observes those long Particles, one wou'd judge that such a long Particle consists of fifty Parts, which one wou'd take to be little Joints; and that from each of those Divisions little hairy Particles do again proceed: Which was such an agreeable Spectacle to me, that I cou'd not forbear saying to myself, Of what a wonderful Composition is such a small Creature, whose whole Body is hardly discernable by our naked Eyes!

I observed with great Attention the aforesaid long Particles, in order to discover whether there were any Motion in those Parts which appeared like Joints: But all that I cou'd discover therein, was, that these little Creatures had power to move or stir those long Particles, which I formerly took to be Hairs, in such a manner, that when they were obliged to creep thro' narrow Passages, they cou'd lay these little hairy Particles down close to their Bodies; and that these Particles had each of 'em but one moving Joint, which was next to that part which was fastened in the Skin.

Thus we see the wonderful Formation of that small Creature call'd a Mite: But what shall we say to the unspeakable number of many kinds and particular forms of other *Animalcula*, some of which are so small, that their whole Body is not only not so thick as the Diameter of one long Particle, which is upon the Body of the Mite, but even not so big as one of the slender Particles, that are upon those joynted Parts of the long hairy Particles, and which *Animalcula* are not to be seen but thro' some of the most magnifying Microscopes: And if one cou'd see the smallest *Animalcula* so big and

so clear, as one sees a Mite, we shou'd be more surpriz'd I believe at their Figures, than we are at that of a Mite: In short, the smallness of the Parts, of which all Bodies are composed and set together, is so very Minute, that it is not to be conceived by Man.

Afterwards there was brought to me an earthen Vessel, in which there was some Flower of Wheat, which had been about 14 Days in my House; in which my Servant Maid, who is very sharp-sighted, saw a great many Mites running about. I took some of 'em, and view'd 'em thro' a Microscope; but I cou'd not perceive, tho' I view'd 'em very nicely, those joined Parts which are as it were cover'd with Hairs, and are upon the Body and Feet of the Mites, and which are so small, that they seem themselves to be nothing but Hairs; and yet I view'd several of these Mites, and but once only I doubted whether I did not see those little Hairs that are upon the hairy Parts. The Parts of the aforesaid Mites, which appear'd to be Hairs behind upon the Body, were not near so long as those of some other Mites that I had taken out of the dried Bladder of an Ox: And tho' these Mites were dead, yet I cou'd perceive upon those Parts that pass'd for Hairs, other and much smaller Hairs.

From which Observation I consider'd, that as the Flies, which we judge to be of one sort, are notwithstanding of very different Kinds; for some of them lodge their Eggs in Flesh, others in Cheese, others again in Dung; and accordingly the Worms that are hatch'd from these Eggs, receive their Food and Growth from the several Substances in which they lye; so likewise among the Mites, there be some that live upon Flesh, and others again upon Meal or Bread.

For my farther Satisfaction, I went to a Grocers Shop, and out of a little Barrel took some Figs that were of the

the growth of the Year 1707 thinking to find a great many Mites among those Figs ; but I met with but three or four Mites that were living, and those had longer hairy Parts upon the hinder part of their Body, than I had seen on any before ; and those hairy Parts were also cover'd with as many small Hairs, as I have said before.

In my search after Mites, I discover'd a kind of *Animalcula* that were smaller than the afore-mention'd, and of a quite different Figure from the other. The Hairs upon the Body and Feet were very short ; the Body, and particularly the Head, were of quite another Make ; for these had upon the side of the Head two short Instruments, with which they made a very quick Motion : From whence I consider'd, whether these Instruments were not given them by Nature to convey their Food to their Mouths, because their Head was shorter than that of a Mite ; which last Creature is likewise the biggest. I also consider'd, whether this little *Animalculum* might not be the Production of a very small Fly.

I have thought fit to make a draught of the so call'd little Hair of one of the afore-mention'd little Mites, that one might in some measure be able to judge how compleat and perfect these contemptible little Creatures are, which, when they are come to their full growth, the naked Eye can hardly perceive to move.

When I communicated to a Curious Gentleman the sight of the hairy Parts of a Mite thro' a Microscope, he compared it to an *Indian* or *Japan* Cane with many Joints ; and said it appear'd to him, as if there were sharp Twiggs spouting out of each Joint.

Fig. 1. A. B. represents such a Hair of a Mite ; together with the hairy Particles branching out of the sides of it, just as it appear'd to the Painter thro' the Microscope.

Moreover, I placed before 4 distinct Microscopes a great Mite, which I judged to be the Female, and stuck upon the Point of a small Pin, to the end that I might the better view those Parts which are taken for Hairs: and I observed little Joints in each of those hairy Particles; and when I turn'd the Mite a little on one side, I cou'd not see those small Parts any more. From whence I concluded, that those hairy Parts were provided with two very small Hairs, all along opposite to each other: So that when one side was turn'd to the right, the other cou'd not be seen; but the Painter discover'd 'em better than I could.

I observ'd that one of these Mites, after she was stuck upon the point of a Pin, laid two Eggs; one of which appear'd to the Eye like a great grey Pea, and the other I judged to be like a Sparrows Egg. Another Mite had laid 4 Eggs; and another, which I had newly placed before a Microscope, laid two. The Mite that had laid 4 Eggs, was only fastned by the two hinder Legs of the Left side of her Body; so that she cou'd move the fore-part, and even displace it: And I observ'd, that after the said Mite had stuck upon the point of a sharp Pin or the space of 10 Days, she had eaten two of her Eggs.

I have open'd the Bodies of several of these Mites, and took two Eggs out of one of them; and one time I took three Eggs out of the Body of another, which were come to their full growth; but in the most of them I cou'd discover no Eggs: But some of them I imagin'd to be Males. And tho' the Liquid Matter of the Eggs, which I took out of their Bodies, was exhaled in very short time; yet those Eggs, which the Mites had laid, preserv'd their perfect bigness and roundness. The reason of which was, as I imagin'd, that the Shells of those Eggs which I had taken out of their Body, had not yet acquir'd their full hardness, and consequently

quently the Liquor was more easily exhaled from them.

The afore-mention'd Mite, that had laid two Eggs, I put into a Box, together with a Microscope before which it was placed ; and on the 17th of October 1708. I put it into my Pocket, to see how long time was required for the hatching the young Mites from the Eggs.

I view'd these Eggs more than once every Day ; and after 3 or 4 Days the Mite was dead. And after I had carry'd 'em 9 Days in my Pocket, I observ'd, that the Eggs, which were at first transparent, became dark at one end, and that that darkness increased from time to time ; so that upon the 30th of October, I could discern but a very small part of the Egg to be clear. And upon the first of November, I observ'd but one Egg ; and that which remain'd of it was so little, and it lay so confused, that I could discover nothing of certain. And in the second Egg I did not only observe the same appearances as in the other, but I saw likewise a little *Animalculum* lying in the Egg, of which I could perceive the Head and some of the hairy Parts of the Body. And whereas the *Animalculum* being now compleat, did not entirely fill the Shell of the Egg, some part of the said Shell was now transparent, by which means I cou'd more plainly discover the *Animalculum* and its Hairs in the Egg. Whereupon I resolv'd to view the said *Animalculum* several times that Day, and about an Hour after my first Discovery, I observ'd the *Animalculum* had forc'd out about one third part of its Body, and was making a great Motion with four of its Feet. But forasmuch as the *Animalculum* could not fasten its Legs, which it had put out of the Shell, upon any place, it made a great stirring with them the whole Day, without being able to bring its Body farther out of the Shell ; and the next Day it was dead.

Upon viewing these Eggs as they were placed before the Microscope with the light of a Candle, we observ'd an unconceivable number of exceeding small Lights or Transparency's in the Egg-shell, which I imagin'd might be occasion'd by the unequal thickness of the Parts of the said Egg-shells ; and that the Transparency therein was caused by little Holes that were thinner than the rest, as we see in the Shell of a Hens Egg.

I observ'd likewise that a Mite, which had been stuck thro' his Back with a point of a Pin, had upon the smallest part of one of his Legs an Egg cleaving to it ; and tho' he mov'd his Foot very much, yet the Egg stuck fast to it all that Day that I observ'd it. From whence I concluded, that the Eggs of Mites are of the same Nature with those of Caterpillars, and other creeping Creatures ; whose Eggs, wherever they fall, stick fast by reason of a slimy or glutinous Matter wherewith they are surrounded ; and this was the reason that the Egg of the Mite stuck so fast to its Foot. But the next Day I observ'd that the Mite had work'd the Egg off his Leg, and by the help of his Claws held it in one of his Feet : and tho' he made a great stir with his Legs, and particularly with that which held the Egg, yet he did not let it go, but took it from one Foot into the other ; which was a very pleasant sight ; but the next Day I could not find the Egg.

Being not content with the aforesaid Observations, I observ'd two other Mites, which I judg'd to be Females, before two Microscopes : One of these Mites had laid two Eggs, and the other three ; and as far as I cou'd judge, they were about three Days old.

I carried those Microscopes, together with the Mites, in the Day time about me : And after the space of Ten Days, I observ'd that two of the Eggs, which lay close by each other, had been hatch'd, and that the young Mites were come out of them, and the Shells lay open; but I could

could not find the Mites. As for the other three Eggs, there came a young Mite out of one of them upon the same Day ; and on the 12th Day came out another Mite, but could not thrust out his Body above half way, and did not live above a Day ; which might proceed, as I imagine, from its being stuck fast in that glutinous Matter, with which the Egg was surrounded. As for the third Egg, it lay length-ways to the right, and I expected before three Days, that the young one shou'd have come out, computing that the *Animalculum* was arriv'd to the full growth in the Egg, and that it had fill'd it in length and breadth ; and there was also a Transparency in the Egg : At last, there came a little Mite out of the third Egg, contrary to my Expectation ; which Mite, I imagin'd, dy'd in the Shell before it could get quite out of it.

When we consider, that the Eggs of Mites are laid one after the other ; and that in the Copulation of these Creatures, a great many of their Eggs

are impregnated at the same time, according to all probability ; and moreover observe, that in the dissecting such an <i>Animalculum</i> , the Intrals thereof cannot be exactly distinguish'd, how small must the <i>Animalcula</i> be that are found in the <i>Semen Masculinum</i> thereof.	600 — 300 — 150 — 450 — 450 —
--	--

Now since there are many People that don't know what a Mite is, and many more that never saw the Eggs thereof, I have thought fit to compare the bigness of their Eggs, by reckoning a certain number of them against a Pidgeon's Egg. Now if one Egg of a Mite be equal to the Diameter of a Hair of ones Head (as it appear'd to me thro' a Microscope,) and 600 Hairs of a Man's Head laid by one another are equal	22500 1800 — 202500 450 — 10125000 810000 — 91125000
--	---

to the length of an Inch, and that the Diameter of a Pidgeon's Egg is three fourths of an Inch, then 450 Diameters of a Mites Egg are equal to one Diameter of a Pidgeon; and supposing their Figures to be alike, we may affirm, that 91125000 Eggs of a Mite are not bigger than one Egg of a Pidgeon.

Upon the 10th of November 1708. by the means of glutinous Matter, I stuck two Mites, which I judg'd to be Females, upon the point of a small Pin; and upon the 12th of the same Month, I found they had laid 3 Eggs between 'em: The next Day there were 4, and soon after 6. I did not keep these Eggs warm, but let them stand upon my Desk, to see how long they wou'd be, in that cold Weather, before they were hatch'd.

Upon the 8th of December, I could perceive that one of these Mites stir'd three of her Legs; but after that time I could perceive no more Life in her.

Since the 10th of November, I view'd the said 6 Eggs several times, and observ'd, that at the thickest end of them (for they seem'd to be exactly shap'd like Hen Eggs) they seem'd darker and darker: And upon the 22d of December, I could perceive upon the thickest end of one of the Eggs, which stuck fast, a little Mite, that had work'd itself so far out of the Shell, as to make a continual stirring with 4 of its Legs; but not being able to fasten them any where, I did believe that it would soon dye.

Upon the 25th of the last mention'd Month, I did further observe another Mite got out of its Shell. From whence we may conclude, that as of Hens and other Creatures, their Chickens are not encreased, nor nourish'd in the Eggs, unless the Mother sits on them; and that all their Eggs are hatch'd about the same time; so here on the contrary, the Eggs of Mites not being sat upon, but from time to time, and the Eggs laid on several Days, the young ones must consequently be hatch'd at different times.

From these Experiments we may observe, what an Influence warmth has on the Eggs of Mites; for from those that I carried in my Pocket, young ones were produc'd upon the 11th or 12th Day; but those which I kept in a Box upon my Desk, were not hatch'd in less than 7 Weeks time.

Thus we see how regular the Production of a Mite is, (which was formerly look'd upon to be the smallest of Creatures,) and how admirable the Structure is of such a wonderful *Animalculum*: Wherefore those who have hitherto been big of that Vulgar Error, that a great many small *Animalcula* are produc'd of themselves, or out of Corruption, I doubt not, but now they will be convinc'd of their mistakes.

I have moreover discover'd both in Cheese and other-ways, a great many empty Husks, or Skins of Mites, which I mostly imagin'd to be the Skins of dead Mites; but when I now perceiv'd that the dead Mites were not transparent, I began to consider whether these Mites might not shed their Skins, as well as several other Creatures: But that Matter demands a further enquiry.

After that we had had for some Days more than ordinary cold and frosty Weather, I got some Mites that were taken from a Bladder broke in pieces, and view'd them with a Glass; and saw that some of them were dead, and others still alive, but very slow in moving.

In the latter end of the Winter, I took a Glass Tube of about the length of a Span, and thickness of a common Writing Pen; and I put therein three or four Mites, which I judg'd to be Females; and together with them a long slice of a dry'd Ox's Bladder, which I had laid in Rain Water for a very small space of Time, because it was very hard and dry; but I prefis'd it again with a clean Cloath, that the Water in it might be no hindrance to the Mites; and then I stopt both ends of the

the Tube with little pieces of Cork: But a few Days afterwards, I could perceive that the little moisture, which had evaporated from the small piece of Bladder, had fixt itself to the sides of the Glass in a great number of exceeding small drops of Water; and that the hairy Parts of the Mites had been so entangled in that small quantity of Moisture, that those little Creatures were unable to extricate themselves from it, and so dyed. Thereupon I opened the Glass Tube, and wiped it with a clean and dry Cloth; and I again put a little bit of dry Bladder in it, together with four Mites; and viewing them in the great Frost, I observ'd that one of the Mites had compos'd all his Legs so exactly under his Body, that as one view'd him on the upper part of his Body, none of 'em could be seen; from whence I concluded, that that Mite was dead.

Having again view'd the said Mite a Day or two after the second hard Frost, I observed, that it lay in the same place, and in the same manner, as it did 2 Months before. The other Mites were also very much dried and shrunk up, and their Bodies bent double, and they were also dead: However, fancying that the aforesaid Mite was still living, I view'd her again, and saw her begin to move one of her Legs; whereupon I warm'd the Glass Tube a little, and then saw the little Creature not only stretch out all her Legs, but begin to creep very gently along. It seem'd to me very wonderful, that so small an *Animalculum* should live above two Months sticking upon the sides of the Glass in so sharp a Frost; nor was its moisture evaporated out of its Body; whereas the dead Mites were so shrunk up, that they were not half so big as when they were alive.

Moreover, I caused one of those Particles, that appear'd to be Hairs, and are found in great Numbers upon the Bodies of Bees, to be drawn by the Painter just as they appear'd thro' the Microscope; but because the whole

whole length of a Hair would take up too much room upon the Paper, I caused the Painter to draw but the half of it, as here in *Fig. 2. C.D.*

In the Month of *August* I stood by a Fishmongers Shop, whilst they were laying their dry Ling in the Water to soften it; and I observ'd several little Creatures running about upon the Fish: Whereupon I took five of them, and put 'em into a Glass Tube, together with a little bit of the said dried Fish, which was Ling, with a design to observe what sort of Creatures would be produc'd from them: And after having shut them up for some Days, I discovered that they had changed their Skins, and that they had made a great many Holes in the Cork which stopt one end of the Tube, and had insinuated themselves so far therein, that one cou'd see none of their Bodies. And being also inform'd, that these *Animalcula* are known by the Furriers, and that they do them a great deal of Mischief, I went to one of that Trade, who shew'd me one of those *Animalcula*, but endeavour'd to perswade me, that they were produced from the Fat which grows upon the Skins of the Furs. Wherefore to remove the popular Prejudices concerning the aforesaid *Animalcula*, I caused my Painter to draw the forsaken Skin of one of those Creatures, just as it appear'd to the naked Eye, as you may see at *Fig. 3.* between E. and F.

Moreover, I placed a Particle of the said *Animalculum* before a Microscope, in order to view those Parts which appear like Hairs to the naked Eye; and I observ'd that those long Particles were encompassed with other Parts, branching or springing out of the sides of them, in the same manner as those of the Mite and the Bee before-mentioned; and yet as small as those Parts are, each of them hath a Hole or Cavity, in which those hairy Parts are planted, that stand upon the new Skin of the *Animalculum*. Those hairy Particles were upon the

darkest part of the Skin, and the whitish Parts were the Joints of the *Animalculum*.

These hairy Parts were long, and short; but otherwise of the same Figure. I caused one of the shortest of them to be drawn, as in Fig. 4. between G. and H. and I judg'd it to be about half as long as the longest. I told the Man from whom I procured these *Animalcula*, that he must not believe they were produced from Fat, but that they were generated from others of the same kind, which had their beginning with all other Creatures.

I mention'd above, that these *Animalcula* having changed their Skins, had dig'd so deep into the Cork, that I could not see them; but upon the 8th of September, I discover'd two flying Creatures like little Beetles, whose fore and hinder part of their Bodies was black, and the middle brown, with some Speckles: And they had two Shields upon their Bodies, which cover'd their Wings; and the Skins, which they had shed after they came out of the Cork, lay about the Glasses.

Now to satisfy my self that the said *Animalcula* were changed from Worms into flying Creatures, I opened two of the Holes that they had made in the Cork; and observ'd in one of them an *Animalculum* lying, which indeed had changed its Skin, yet was not become black, but was still white, and was about the bigness or size of our common small Flies.

Upon the 11th of September, two more of the afore-mention'd *Animalcula* came out of the Cork; and the Female, which at first was all white, and was still like an *Aurelia*, and stir'd very much, became red, and then turn'd to a darker red:

Upon the 17th of the same Month, the *Aurelia* had shed its Skin, which was exceeding thin, and then it ran about the Glass; but it was not arrived to that blackness which others had, that had run longer about the Glass.

Fig. 5. I. K. L. represents one of those *Animalcula*, and I. L. the two little Shields that cover the Wings when it does not fly. K. is the Tail or hinder Part of the Body ; on each side of which are the Wings, which were partly folded : For that *Animalcule* cannot sheath its Wings in the Shields, without partly folding the Ends of them...

Now since we see that the Worms, whose Skin is represented at *Fig. 3.* are turn'd into flying Creatures, which lay their Young or Eggs in all Parts of a House ; and since it is natural to all Creatures to stow their Eggs where they can be best preserv'd and hatch'd, it will not appear strange, that these Creatures are mostly found upon Furs that are Fat ; and so the Furriers themselves have inform'd me.

I took a little Fat of an Ox, and laid it by these *Animalcula* ; but I could not perceive that they fed upon it.

About the end of the Month of May, I sought for some Mites upon a piece of some dry'd Flesh of a Whale, which hung upon a little String fastned to a Nail in my Closet ; and I perceived that several of the said blackish *Animalcula* fell off from the piece of Whales Flesh ; and this happen'd four times one after another upon several Days : Whereupon I put most of the flying Creatures into a Glass Tube, which I stopt in such a manner as not to exclude the Air ; and I put into the said Tube a little bit of Whales Flesh, upon which I observ'd that they fed greedily, and that a great deal of their Excrements lay upon the Glass.

Upon the 31st of May, I saw three Eggs lying upon the Glass, and they were white ; but having none of that Viscous Matter about them, wherewith the Eggs of most of the *Animalcula* are endow'd, these Eggs did not stick to the Glass, but fell among the Excrements ; so that I could not distinguish them.

In the first Glass Tube, in which were those *Animalcula* which I had shut up the whole Winter, and were turn'd into flying Creatures, I observ'd two young *Animalcula* running about, whose Skins are described by Fig. 3. but how many of them there were I could not discover, because about a Month before I had put into the Tube the Tail of a Pole-Cat, to the end that they might subsist on the Fur, which I was told they used to feed upon ; and afterwards I put in a little bit of the Flesh of a Whale into the same Tube.

These Young *Animalcula* were but little bigger than the Eggs before-mention'd.

Since that time, I saw the said *Animalcula* but once ; and the Eggs which I saw, in a Day or two after I could discover no more, nor any of the small *Animalcula* : From whence I concluded, that the afore-mention'd flying Creatures had eat up their Eggs and Young ones.

I took the Tail of the Pole-Cat out of the Glass, and examining it, I found a living *Animalculum* in it as small as an Egg, which was very white to the naked Eye. I shut it up in a little Glass, and put a small bit of the Flesh of a Whale into it , and I perceived that, after a few Hours, it had assumed a rosie Colour. I also found three Eggs, in one of which the *Animalculum* was so large, that by the help of a Microscope, I could discover part of the Body through the Shell of the Egg : And two Days after, being the 8th of June, I could perceive through a Microscope, upon the wreathed or knotted Parts, red Streaks, upon which were long Hairs ; and in the Evening the *Animalculum* was got out of the Egg-shell, and the next Morning it had assumed a rosie Colour.

Upon the 13th of June, I saw some few Eggs upon the Glass ; upon which I took two out, and put them into a Glass Tube of the length and breadth of a Finger, leaving

leaving 6 or 8 others in the aforesaid Glass ; and I took the afore-mention'd blackish *Animalcula* out of the Glass, and I carried the Glass Tube, in which the two Eggs were, about with me in my Pocket, that I might see how much sooner these would be hatch'd, than those which I left upon my Desk in a great Glass Tube : And I discovered upon the 15th of June young ones hatch'd from the Eggs which I carried about me ; as upon the 20th, were those in the Tube that lay upon my Desk.

Upon the 5th of July, I observ'd that in the two several Glasses that contain'd the afore-mention'd Worms (which indeed ought not to be call'd Worms, because they did not creep, but rather running Creatures) that some of these Creatures had left the bit of Whales Flesh; and kept themselves very still upon the Cork ; insomuch, that I fancied they were going to be changed into flying Creatures : But I was mistaken ; for they only lay upon the Skins they had shed ; and then the flying Creatures daily laid their Eggs, out of which also came young ones ; but most of the Eggs that had been laid were eaten up ; to prevent which, some of those flying Creatures were so cunning, as to thrust their Eggs between the Cork and the Glass, insomuch, that some of the Eggs became flattish ; notwithstanding which, young ones came out of them.

Few Days after the 5th of July, I perceived that some of the running or creeping Creatures had gnaw'd holes in the Cork ; into which they had dug so deep, that one could not see their Bodies.

In the beginning of August, I view'd them again, but could not perceive any flying Creatures, as I expected, to be changed from the creeping ones : Wherefore I cut off a little of the Cork in two several Places where those creeping Creatures had been digging ; and then I discover'd one *Animalcolum*, which had changed its Skin for the last time, and lay still upon the hinder part of its Body,

Body, and was lying in the *Aurelia*, which was white ; only upon the knotches of its Body, there were red Streaks ; and when I went to touch it with a Needle, it stir'd its Body very much.

Upon the 10th of *August*, I observ'd that one of the *Aurelia's* was stript of its little Skin, which was exceeding thin ; so that it was an agreeable sight as I view'd it thro' the Microscope. This *Animalculum* did not seem to have any Motion in it, and it was of a dark Colour.

In all my Observations I never could perceive any Copulation among those *Animalcula*, when they were changed into flying Creatures : From whence I concluded, that they were all Females, as many other Flies are.

Thus then are those Furriers, who with great Zeal have maintained that the said *Animalcula* were produced out of Fat, convinced of that Error, in which they have so long persisted ; yet I could not convince one of them, till I had left with him a Glass Tube, into which I had put some of the Eggs of those Creatures, and till he had seen the little Worms come out of the Eggs, and daily grow bigger and bigger.

*Goedartius
de Insect.
Num. 114.*

John Goodaert in his 2d part of the Origine and Properties of Worms, Caterpillars, &c. calls these Creatures, which he describes in Page 168, the *Furriers Plague*, because they do them no small mischief ; and says, that he has found of them in the Feathers of a Duck, and supposes 'em to be produced out of Fat.

From whence it appears, that notwithstanding all the Pains that the said *Goodaert* bestow'd in his enquiry after those Creatures, which he calls bloodless, he was got yet no further than to maintain, that there were *Animalcula* that were produced of themselves. But who cares to take so much Pains in the Investigation of the

Nature

(415)

Nature of these Creatures, as I have done : for I have kept them two Winters shut up in Glass Tubes ; and I judge that they can secure themselves in Wood against the Winter, because they had dug deep into the Cork; insomuch, that if I had not hinder'd them, they would have bored thro' in several Places.

I threw the said *Animalcula*, as well the Living as the Dead, together with their Food, being dry'd Wales Flesh, into Water, in the Month of June, 1711. I shall conclude, and with great Respect remain,

Honourable Gentlemen,

Your Humble Servant,

Anthony van Leeuwenhoek.

II. Some